

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
10 February 2005 (10.02.2005)

PCT

(10) International Publication Number  
**WO 2005/013444 A1**

(51) International Patent Classification<sup>7</sup>:

H01S 3/067

(74) Agent: JONES, Graham, Henry; Graham Jones & Company, 77 Beaconsfield Road, Blackheath, London SE3 7LG (GB).

(21) International Application Number:

PCI/GB2004/003265

(22) International Filing Date: 28 July 2004 (28.07.2004)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

0317604.7 28 July 2003 (28.07.2003) GB  
0404594.4 2 March 2004 (02.03.2004) GB  
0406765.8 26 March 2004 (26.03.2004) GB

(71) Applicant (for all designated States except US):

SOUTHAMPTON PHOTONICS LIMITED [GB/GB]; 3 Wellington Park, Tollbar Way, Hedge End, Southampton SO30 2QU (GB).

(72) Inventors; and

(75) Inventors/Applicants (for US only): VARNHAM, Malcolm, Paul [GB/GB]; 76 Grange Road, Alresford, Hampshire SO24 9HF (GB). ZERVAS, Mikhall, Nicholaos [GR/GB]; 34 Hill Farm Road, Southampton, Hampshire SO15 5SR (GB). PAYNE, David, Neil [GB/GB]; 13 Sylvan Road Hamble, Southampton, Hampshire SO31 4QG (GB). NILSSON, Lars, Johan, Albinsson [SE/GB]; 16 Glebe Court, Highfield, Southampton, Hampshire SO17 1RH (GB).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declaration under Rule 4.17:

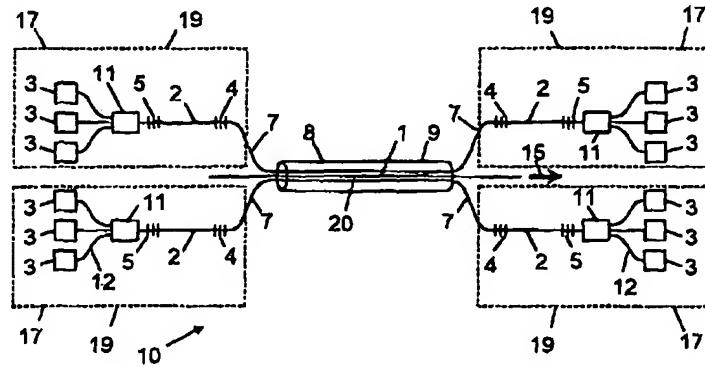
— of inventorship (Rule 4.17(iv)) for US only

Published:

— with international search report

[Continued on next page]

(54) Title: EYE SAFE HIGH POWER FIBRE LASER



WO 2005/013444 A1

(57) Abstract: Apparatus for providing optical radiation (15) comprising a pump source (19) and at least one first amplifying waveguide (1), characterised in that the first amplifying waveguide (1) emits optical radiation (15) in excess of 1400nm when pumped by the pump source (19). In one embodiment, the pump source (19) comprises a plurality of laser diodes (3) and a plurality of second amplifying waveguides (2). The first amplifying waveguide (1) is pumped by the second amplifying waveguides (2). The second amplifying waveguides (2) are pumped by the laser diodes (3). The second amplifying waveguides (2) are configured to improve the beam quality of radiation emitted by the laser diodes (3). Advantageously, the apparatus can be configured such that the optical radiation (15) emitted by the first amplifying waveguide (1) has a higher brightness when the second amplifying waveguide (2) emits at a first wavelength.



- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.